

REMARKS

Claims 8-16 are presently pending in this application. Claims 8-16 have been amended in this response to clarify certain aspects of these claims. The status of the claims in the Office Action dated July 1, 2005, is as follows:

(A) Claims 8-16 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite.

(B) Claims 8-16 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement.

(C) Claims 8-14 and 16 were rejected under 35 U.S.C. § 103 over U.S. Patent No. 4,339,319 issued to Aigo ("Aigo") in combination with either U.S. Patent No. 4,655,884 issued to Hills et al. ("Hills") or U.S. Patent No. 4,801,947 issued to Lichtenberger et al. ("Lichtenberger").

(D) Claim 15 was rejected over the combination of Aigo, Hills or Lichtenberger, and either U.S. Patent No. 4,192,729 issued to Cancelleri et al. ("Cancelleri") or U.S. Patent No. 5,503,730 issued to Osano et al. ("Osano").

A. Response to Rejection Under Section 112, Second Paragraph

Claims 8-16 were rejected under 35 U.S.C. § 112, second paragraph, on the grounds that several terms in these claims were not found in the specification. Without conceding to the merits of this rejection, claim 8 has been amended to replace "device support" with a "semiconductor process machine having a deck." This subject matter is found in Figures 1 and 9-11, and also in the text at, for example, page 3, lines 8-11, and page 8, lines 3-10. More specifically, the deck is shown in Figures 1 and 9-10 as the platform to which the workpiece supports are mounted. Claim 8 has also been amended to delete "carried" and "carrying plane." Other aspects of amended claim 8 are set forth in the specification. Therefore, the rejection of claims 8-16 under 35 U.S.C. § 112, second paragraph should be withdrawn.

B. Response to Rejection Under Section 112, First Paragraph

Claims 8-16 were rejected under 35 U.S.C. § 112, first paragraph, on grounds analogous to the rejection under Section 112, second paragraph. As such, for the reasons explained above with respect to the rejection under Section 112, second paragraph, the rejection of claims 8-16 under Section 112, first paragraph, should also be withdrawn.

C. Response to Section 103 Rejection – Aigo and Hills or Lichtenberger

Claims 8-14 and 16 were rejected under 35 U.S.C. § 103 over the combination of Aigo and Hills or the combination of Aigo and Lichtenberger. For the reasons explained below, the cited combinations of references fail to disclose or suggest all the features of claim 8, and there is no suggestion to combine either Hills or Lichtenberger with Aigo to come up with the claimed combination of features.

1. Claim 8 Is Directed Toward an Apparatus Including a Rotatable Workpiece Holder Supported by a Base That Is At or Above a Deck of a Semiconductor Process Machine

Claim 8 is directed toward an apparatus for processing workpieces that includes a semiconductor process machine having a deck and a process vessel in the semiconductor process machine configured to receive at least one processing liquid. The apparatus also includes a workpiece support having a base attached to the deck of the semiconductor process machine and a movable workpiece holder configured to carry a workpiece at least proximate to the processing vessel. A drive unit is operatively coupled to the workpiece holder to rotate the workpiece about an axis normal to the workpiece. Additionally, the base of the workpiece support is at or above the level of the deck.

Apparatus in accordance with claim 8 are useful for plating materials onto the front face of a workpiece, cleaning or etching the surface of a workpiece, and/or performing maintenance on the workpiece holders or the processing vessels. One advantage, for example, is that the workpiece holder is coupled to a drive unit to rotate the workpiece about an axis normal to the workpiece for enhancing the properties of the finished surface. Another advantage, for example, is that the base of the workpiece

support is at or above the deck so that the workpiece support can be easily removed from the processing machine for servicing either the processing vessel or the workpiece support. This enables quick maintenance of the semiconductor process machine without having to access an internal portion of a chamber.

2. The Aigo, Hills and Lichtenberger References

Aigo is directed toward a method and apparatus for electroplating semiconductor wafers. Referring to Figure 1 of Aigo, this reference discloses a device having a base 1, a container 2 that includes a plurality of cup-shaped plating basins, and a cover 3 attached to guide bars 5 to move the cover 3 vertically with respect to the container 2. As shown in Figure 2 of Aigo, each holder 20 is aligned and engageable with a relevant one of the plating basins. (Column 1, lines 55-57.) Referring to Figures 3 and 5 of Aigo, this reference further teaches that the plating basin 10 includes protrusions 21 that guide the semiconductor wafer S into the plating basin 10 and support pins 22 that have sharp tips to support the semiconductor wafer S. (Column 2, lines 54-68.) The pins 22 are attached to the protrusions 21, and some of the pins 22 are coupled to a cathode. (Column 3, lines 2-6.) In operation, a spring 28 in the holders presses the semiconductor wafer S against the pins 22. (Figure 3 and column 3, lines 9-11 and 31-33.) Because the protrusions 21 are fixed to the plating basin 10 and the pins 22 are fixed to the protrusions 21, the pins 22 appear to be fixed relative to the plating basin 10.

Hills is directed toward a nickel-plating process to adhere a nickel layer to a refractory metal surface. Hills mentions that the article upon which the nickel is plated was rotated in one example to insure uniform coverage by the plated metal. Hills discloses that the articles can be used as insulation-backed heat shields.

Lichtenberger discloses a process and apparatus for electro-depositing a metallic layer onto a surface of a substrate. Lichtenberger, more specifically, discloses forming monolithic foils, layers or plates of a metallic substance to produce orifice "plates" utilized in fluid jet or liquid jet printing devices. Referring to Figure 1, Lichtenberger discloses attaching generally vertically orientated substrates 16 to a wheel 18. The

wheel 18 is rotated within a tank 12 to pass the substrates past anodes during the electro-deposition process.

3. The Combination of Aigo with Hills or Lichtenberger Fails to Disclose or Suggest, *inter alia*, a Rotatable Workpiece Holder Attached to a Base That Is At or Above the Deck of the Semiconductor Process Machine

Amended claim 8 is patentable over the combination of Aigo and Hills or the combination of Aigo and Lichtenberger because these combinations of references fail to disclose or suggest several features of claim 8. For example, these references do not disclose the combination of a semiconductor process machine having a deck, a workpiece support having a base that is at or above the deck, a movable workpiece holder configured to carry a workpiece at least proximate to a processing vessel, and a drive unit coupled to the workpiece holder to rotate the workpiece about an axis normal to the workpiece. First, these references do not disclose a semiconductor processing machine having a deck and a workpiece support having a base that is at or above the deck. Second, these references do not disclose or suggest the combination of a processing vessel, a workpiece support having a movable workpiece holder configured to carry a workpiece at least proximate to the processing vessel, and a drive unit operatively coupled to the workpiece holder to rotate the workpiece about an axis normal to the workpiece. Although Aigo discloses a machine for processing semiconductor wafers, the apparatus in Lichtenberger discloses a rotating wheel that moves the plated articles about an axis that appears to be parallel to the plated articles. As such, combining the rotatable wheel of Lichtenberger with the plating basin of Aigo would result in a device in which the workpiece is not rotated about an axis normal to the workpiece. Thus, the combination of Aigo and Hills and the combination of Aigo and Lichtenberger do not disclose or suggest at least one feature of claim 8.

Claim 8 is further patentable because any attempt to combine Aigo with Hills or Lichtenberger to come up with the claimed combination of elements set forth in amended claim 8 would necessarily be based upon impermissible hindsight reasoning. As stated in C.R. Bard Inc. v. M3 systems Inc., 48 U.S.P.Q.2d, 1232 (Fed. Cir. 1998), "it is insufficient that prior art shows similar components, unless it also contains some

teaching, suggestion, or incentive for arriving at the claimed structure." As stated by the Court in re Sernaker, 217 U.S.P.Q. 1, 6 (Fed. Cir. 1983) in discussing an earlier case, "The lesson of this case appears to be that prior art references in combination do not make an invention obvious unless something in the prior art references would suggest the advantage to be derived from combining their teachings." The applicants submit that, as in the C.R. Bard and Sernaker cases, the claimed invention in the present case is nonobvious over these references because there is nothing in the references to suggest that an improvement in the ability to perform maintenance might be achieved by combining their teachings. Moreover, there is nothing in these references to suggest that the improvement achieved by the combination of a workpiece support having a base that is at or above the deck of a semiconductor process machine and a rotatable workpiece holder configured to rotate a workpiece might be achieved by combining their teachings.

To avoid an incorrect conclusion of obviousness, the Examiner must view the invention as a whole and each of the references as a whole. In particular, the Examiner is not permitted to disregard disclosures in the references that diverge from and teach away from the invention at hand, W.L. Gore and Ass., Inc. v. Garlock, Inc., 220 U.S.P.Q. 303, 311 (CIFIC 1983). In the present case, the problems addressed by Aigo are different from the problems addressed by (a) the Hills and Lichtenberger references, and (b) the present invention. More specifically, Aigo is directed toward a plating apparatus that permits the plating liquid to flow in an essentially laminar or stream condition, Hills is directed toward plating nickel on a refractory metal for non-semiconductor applications, and Lichtenberger is directed toward depositing metal onto a surface of a substrate to form an orifice plate. Moreover, there is no suggestion to use a rotating head in Aigo because Aigo discloses electrical contacts that are fixed relative to the tank, and thus rotating the workpiece across the fixed contacts of Aigo would likely damage both the contacts and the workpiece. Therefore, when taken as a whole, there is no suggestion to combine the rotational aspects of either Hill or Lichtenberger with Aigo to come up with an apparatus including a processing vessel, a workpiece support having a base at or above a deck of a semiconductor process machine, a movable workpiece holder configured to hold a workpiece proximate to the

processing vessel, and a drive unit that rotates the workpiece about an axis generally normal to the workpiece.

Claim 8 is accordingly patentable over either the combination of Aigo and Hills or the combination of Aigo and Lichtenberger. Claims 9-16 are accordingly patentable over these combinations of references as depending from claim 8, and also because these dependent claims include additional subject matter.

D. Response to Section 103 Rejection – Claim 15

Claim 15 was rejected over the combination of Aigo, Hills or Lichtenberger, and Cancelleri or Osano. Cancelleri and Osano are cited by the Examiner for the proposition that these references teach an electrode surrounded by a sheath. Claim 15 depends from claim 8, and thus the rejection of claim 15 over the base references of Aigo in combination with either Hills or Lichtenberger should be withdrawn for the reasons explained above with respect to claim 8.

E. Conclusion

In view of the foregoing, the pending claims comply with 35 U.S.C. § 112 and are patentable over the cited art. The applicant accordingly requests reconsideration of the application and a Notice of Allowance. If the Examiner has any questions or believes a telephone conference would expedite prosecution of this application, the Examiner is encouraged to call Paul T. Parker at (206) 359-3258.

Respectfully submitted,

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